CLAIMS

WHAT IS CLAIMED IS:

1. A microresistivity device, comprising:

a set of concentric electrodes, said set including a first electrode, a second electrode, a third electrode, a fourth electrode, a fifth electrode, and a sixth electrode,

wherein said first electrode lies inside said second electrode, said second electrode lies inside said third electrode, said third electrode lies inside said fourth electrode, said fourth electrode lies inside said fifth electrode, and said fifth electrode lies inside said sixth electrode.

2. The microresistivity device of claim 1, said first electrode emitting a current, at least one of said fifth and sixth electrodes being a current return for said current, wherein said second electrode measures a voltage corresponding to said current.

3. The microresistivity device of claim 2, said voltage being linearly proportionate to a resistivity of a formation surrounding said microresistivity device, said resistivity being inversely proportionate to the magnitude of said current.

4. The microresistivity device of claim 1, said first electrode emitting a first current, and said fourth electrode emitting a second current, at least one of said fifth and sixth electrodes being a current return for said first and second currents, said first and second currents minimizing a voltage between said second and third electrodes.

5. The microresistivity device of claim 4, wherein there exists a voltage at said second electrode that is linearly proportional to a resistivity of a formation surrounding said microresistivity device, said resistivity being inversely proportionate to said first current.

6. The microresistivity device of claim 4, wherein there exists a voltage at said second electrode that is linearly proportional to a resistivity of a formation surrounding said microresistivity device, said resistivity being equal to zero.

7. The microresistivity device of claim 1, further comprising:

a seventh electrode outside said sixth electrode,

wherein said first electrode emits a combined first current and second current, said seventh electrode being a current return for said first current and said fourth electrode being a current return for said second current, said first and second currents minimizing a voltage between said fifth and sixth electrodes.

8. The microresistivity device of claim 7, wherein there exists a voltage at said second electrode that is linearly proportionate to a resistivity of a formation surrounding said microresistivity device, said resistivity being inversely proportionate to said first current.

9. The microresistivity device of claim 7, wherein said voltage between said fifth and sixth electrodes is zero.

10. The microresistivity device of claim 7, further comprising:

a tool mandrel,

wherein seventh electrode is located on said tool mandrel.

11. The microresistivity device of claim 1, further comprising:

a pad suitable to be pressed against a borehole wall,

wherein said first electrode, said second electrode, said third electrode, said fourth electrode, said fifth electrode, and said sixth electrode are located on said pad.

12. The microresistivity device of claim 1, further comprising:

a seventh electrode outside said sixth electrode,

wherein said first electrode emits a first current, said fourth electrode emits a second current, and at least one of said fifth and sixth electrodes emits a third current, said seventh electrode being a current return for said first, second and third currents, said first, second, and third currents minimizing a voltage between said second and third electrodes.

13. The microresistivity device of claim 12, wherein there exists a voltage at said second electrode that is linearly proportionate to a resistivity of a formation surrounding said microresistivity device, said resistivity being inversely proportionate to said first current.

14. The microresistivity device of claim 12, wherein said voltage between said second and third electrodes electrodes is zero.

15. A microresistivity tool for measuring at multiple depths into a formation, said microresistivity tool comprising:

a tool body having a length; and

a set of electrodes on said tool body, said set of electrodes including a first electrode, a second electrode, a third electrode, a fourth electrode, a fifth electrode, and a sixth electrode arranged linearly with respect to said length;

wherein said first electrode is a current source.

16. The microresistivity tool of claim 15, wherein said set of electrodes includes paired electrodes that are short circuited together to provide a compensated measurement.

17. The microresistivity tool of claim 15, further comprising:

a seventh electrode not located on said tool body.

18. The microresistivity tool of claim 15, at least one of said fifth and sixth electrodes being a current return for said current, wherein said second electrode measures a voltage corresponding to said current.

19. The microresistivity tool of claim 18, said voltage being linearly proportionate to a resistivity of a formation surrounding said microresistivity tool, said resistivity being inversely proportionate to the magnitude of said current.

20. The microresistivity tool of claim 15, wherein said current from said first electrode is a first current, said fourth electrode emitting a second current, at least one of said fifth and sixth electrodes being a current return for said first and second currents, said first and second currents minimizing a voltage between said second and third electrodes.

21. The microresistivity tool of claim 20, wherein there exists a voltage at said second electrode that is linearly proportional to a resistivity of a formation surrounding said microresistivity tool, said resistivity being inversely proportionate to said first current.

22. The microresistivity tool of claim 20, wherein there exists a voltage at said second electrode that is linearly proportional to a resistivity of a formation surrounding said microresistivity tool, said resistivity being equal to zero.

23. The microresistivity tool of claim 15, further comprising:

a seventh electrode,

wherein said first electrode emits a combined first current and second current, said seventh electrode being a current return for said first current and said fourth electrode being a current return for said second current, said first and second currents minimizing a voltage between said fifth and sixth electrodes.

24. The microresistivity tool of claim 23, wherein there exists a voltage at said second electrode that is linearly proportionate to a resistivity of a formation surrounding said microresistivity tool, said resistivity being inversely proportionate to said first current.

25. The microresistivity tool of claim 23, wherein said voltage between said fifth and sixth electrodes is zero.

26. The microresistivity tool of claim 15, further comprising:

a seventh electrode,

wherein said first electrode emits a first current, said fourth electrode emits a second current, and at least one of said fifth and sixth electrodes emits a third current, said seventh electrode being a current return for said first, second and third currents, said first, second, and third currents minimizing a voltage between said second and third electrodes.

27. The microresistivity tool of claim 26, wherein there exists a voltage at said second electrode that is linearly proportionate to a resistivity of a formation surrounding said microresistivity tool, said resistivity being inversely proportionate to said first current.

28. The microresistivity tool of claim 26, wherein said voltage between said second and third electrodes electrodes is zero.

29. The microresistivity tool of claim 15, said tool body being a pad.

30. A method to determine a flushed zone resistivity behind a borehole wall formed by a borehole, comprising:

inserting a resistivity measurement device into said borehole;

measuring a first resistivity at a first distance from said resistivity measurement device;

measuring a second resistivity at a second distance from said resistivity measurement device;

measuring a third resistivity at a third distance from said resistivity measurement device;

measuring a fourth resistivity at a fourth distance from said resistivity measurement device;

calculating said flushed zone resistivity from said measured first resistivity, said second resistivity, said third resistivity, and said fourth resistivity, said flushed zone being a region of formation invaded by drilling fluid.

31. The method of claim 30, wherein a ratio between said flushed zone resistivity and a resistivity of said drilling fluid is greater than ten thousand.

32. The method of claim 30, further comprising:

calculating at least one of a standoff distance, a mudcake thickness, drilling fluid resistivity, and a mudcake resistivity from said measured first resistivity, said second resistivity, said third resistivity, and said fourth resistivity, said standoff distance and said mudcake thickness being regions between said resistivity measurement device and said borehole wall.

33. The method of claim 32, wherein said calculating includes calculating all of said standoff distance, said mudcake thickness, said drilling fluid resistivity, and said mudcake resistivity from said measured first resistivity, said second resistivity, said third resistivity, and said fourth resistivity.

34. The method of claim 30, wherein said step of calculating is by use of inversion.

35. The method of claim 30, said microresistivity measurement device including at least seven electrodes.

36. The method of claim 30, further comprising:

measuring a fifth resistivity at a fifth distance from said resistivity measurement device; and

measuring a sixth resistivity at a sixth distance from said resistivity measurement device.